Liquid Crystals, a laboratory to General Relativity

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It will be shown that the theory of the gravitational field, described by the general relativity, and the theory of the liquid crystals, as described by Hess and Simões [D. Baalss and S. Hess, Phys. Rev. Lett. 57, 86 1986. M. Simões, A. de Campos, D. Barbato. Phys. Rev. E 75, 061710, 2007], share surprisingly similarities; it is possible to formulate the principles of both theories using alike statements, leading to the establishment of a detailed correspondence between some aspects of them. As consequence, some textures of the nematic liquid crystals could be described by an Einstein-like equation where the elastic stress tensor substitutes the energy momentum tensor. Furthermore, the flat limit of such equation is a generalization of the Poisson equation describing textures originated from liquid crystal's defects, in which their dependence of the temperature could be straightforwardly obtained.